UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

APPARATUS FOR EXHIBITING PHOTOGRAPHS OF MOVING OBJECTS.

SPECIFICATION forming part of Letters Patent No. 493,426, dated March 14, 1893.

Application filed August 24, 1891. Serial No. 403,536. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Apparatus for Exhibiting Photographs of Moving Objects, (Case No. 930,) of which the following is a specification.

The present invention relates to apparatus for using photographs which have been taken in rapid succession of an object in motion, by means of which a single composite picture is seen by the eye, said picture giving the impression that the object photographed is in actual and natural motion.

The object of the invention is to provide an efficient apparatus adapted to pass a large number of pictures rapidly before the eye of the beholder in regular order, and the invention consists in the several combinations forming the apparatus, or definite parts thereof, hereinafter fully described, and set forth in the claims.

In the accompanying drawings, Figure 1 is a plan view of the reproducing apparatus, the top of the inclosing case being removed. Fig. 2 is a rear view of the apparatus, the back of the case and the motor being removed and the frame being broken away to show some of the parts behind it. Fig. 3 is a sectional view showing the arrangement of reflector, light, film, &c. Fig. 4 is a view illustrating the reproduction of stereoscopic pictures; and Fig. 5 shows a modified form of lens and shutter.

The film 3, on which a large number of photographs of a moving object have been taken in such manner that any two successive pictures are almost identical in appearance as set forth in my application, Serial No. 403,534, filed August 24, 1891, is passed back and forth over rollers 36, 37 at the top and bottom of the inclosing case respectively, the ends of the film being connected so that the film forms an endless band or belt. This band is advanced at the proper rapid speed by the reel 38 on the shaft 39 driven through the belt 40 by any suitable motor. The film passes over the pulley 41, under the light spring 42, through the slit 43, and over the reel 38. In order to get a sufficiently long strip or tape—say several hundreds or thousands of feet—the rollers 36, 37 may be multiplied to any desired extent.

44 is a brake-roller, carried by the crank-arm 44', provided with a suitable handle and thrown forward by a spring 44''.

Below the passage through which the film is led is a glass cell 45 containing alum water for the purpose of absorbing heat-rays from the electric or other light 46. This is shown as an incandescent lamp, which, when the apparatus is in use, is continuously lighted, but it is only essential that the light should exist when an opening in the shutter comes over a picture. The cell 45 has a branch 47 terminating in a reservoir or tank 48, which is tightly closed by a rubber diaphragm 49 held in place by the clamping ring 50. On the surface of the alum water is a surface 51 of oil to still further prevent evaporation. Above the cell 45 is a ground-glass plate 52 for still further absorbing the heat-rays and protecting the film. This plate may be tinted to give the picture the appearance of a colored picture, the plate being all of one tint, or partially of one tint and partially of another tint, according to the subject and arrangement of the picture. Above the film are suitable lenses or prisms 53, and a sight opening 54 through which an observer can look to see the reproduced picture.

55 is a reflector below the lamp to throw the light upward to the film.

In the reproducing apparatus a shutter is used for covering and exposing the pictures successively in much the same manner as the sensitive film is exposed in taking the photographs. The position of such a shutter is indicated in dotted lines at 56, Fig. 1. This shutter has one or more openings 57 near its edge, the single opening shown being directly over one of the pictures on the film. This shutter is continuously revolved through the belt 40 with a speed sufficient to bring the opening centrally over a picture at intervals practically equal to the intervals between exposures in taking the pictures. The means for advancing the film and for operating the shutter to expose the pictures may be the same in all particulars as in the apparatus for taking pictures described in my application, Serial No. 403,535, filed August 24, 1891. When the brake 44 is released by means of the han-